

Harvest Estimate for the Gastineau Hatchery Roadside Sport Fishery in Juneau, Alaska during 1995

by

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Alaska Department of Fish and Game

Division of Sport Fish



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Weights and measures (metric)		General		Mathematics, statistics, fisheries	
centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H _A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	and	&	catch per unit effort	CPUE
hectare	ha	at	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km			confidence interval	C.I.
liter	L			correlation coefficient	R (multiple)
meter	m	east	E	correlation coefficient	r (simple)
metric ton	mt	north	N	covariance	cov
milliliter	ml	south	S	degree (angular or temperature)	°
millimeter	mm	west	W	degrees of freedom	df
Weights and measures (English)		Copyright	©	divided by	÷ or / (in equations)
cubic feet per second	ft ³ /s	Corporate suffixes:		equals	=
foot	ft	Company	Co.	expected value	E
gallon	gal	Corporation	Corp.	fork length	FL
inch	in	Incorporated	Inc.	greater than	>
mile	mi	Limited	Ltd.	greater than or equal to	≥
ounce	oz	et alii (and other people)	et al.	harvest per unit effort	HPUE
pound	lb	et cetera (and so forth)	etc.	less than	<
quart	qt	exempli gratia (for example)	e.g.,	less than or equal to	≤
yard	yd	id est (that is)	i.e.,	logarithm (natural)	ln
Spell out acre and ton.		latitude or longitude	lat. or long.	logarithm (base 10)	log
Time and temperature		monetary symbols (U.S.)	\$, ¢	logarithm (specify base)	log ₂ , etc.
day	d	months (tables and figures): first three letters	Jan,...,Dec	mideye-to-fork	MEF
degrees Celsius	°C	number (before a number)	# (e.g., #10)	minute (angular)	'
degrees Fahrenheit	°F	pounds (after a number)	# (e.g., 10#)	multiplied by	x
hour (spell out for 24-hour clock)	h	registered trademark	®	not significant	NS
minute	min	trademark	™	null hypothesis	H ₀
second	s	United States (adjective)	U.S.	percent	%
Spell out year, month, and week.		United States of America (noun)	USA	probability	P
Physics and chemistry		U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

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**HARVEST ESTIMATE FOR THE GASTINEAU HATCHERY ROADSIDE
SPORT FISHERY IN JUNEAU, ALASKA DURING 1995**

by

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ABSTRACT

Angler effort and harvests of chinook salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, and pink salmon *Oncorhynchus gorbuscha* were estimated at Gastineau Hatchery from 3 July to 25 September 1995. An estimated 21,546 (SE = 555) angler-hours were expended to harvest a total of 157 (SE = 36) large chinook salmon at least 28 inches (71 cm) in total length, 223 (SE = 102) small chinook salmon (< 28 inches in length), 2,212 (SE = 303) large coho salmon at least 16 inches (41 cm) in length, 422 (SE = 103) small coho salmon (< 16 inches in length), 2,047 (SE = 254) chum salmon, and 3,421 (SE = 250) pink salmon.

Key words: Creel survey, roadside, angler effort and harvest, sport fishery, hatchery, chinook salmon, *Oncorhynchus tshawytscha*, coho salmon, *Oncorhynchus kisutch*, chum salmon, *Oncorhynchus keta*, pink salmon, *Oncorhynchus gorbuscha*, Juneau, Gastineau Hatchery, Southeast Alaska.

INTRODUCTION

Roadside sport fisheries in marine waters near Juneau offer unique fishing opportunities for both Alaskan residents and tourists visiting the area. In 1994, anglers spent an estimated 23,855 angler-days of shoreline saltwater fishing participation along the Juneau roadside (Howe et al. 1995). This represents 48% of the total marine shoreline participation (50,003 angler days) in Southeast Alaska and 19% of the total marine participation (125,274 angler days) in the entire Juneau area during 1994. Demand for roadside fishing opportunities in the Juneau area is very high as about 39% of the population of Southeast Alaska resided in the Juneau borough in 1990 according to the U.S. census, and the area is also visited by over 400,000 tourists each summer (McDowell Group 1994). The Gastineau Hatchery, located about 3 miles north of Juneau (Figure 1), is a popular destination for tourists and residents alike: 90,223 paying customers toured the facility in 1995 (Rick Focht, Gastineau Hatchery, Juneau, personal communication). The hatchery is owned and operated by Douglas Island Pink and Chum, Inc., a private non-profit corporation.

Although harvests for the entire Juneau road system are estimated by questionnaires mailed annually to sport anglers, an onsite creel survey was used to obtain more timely and detailed information on the sport fishery for terminal runs of coho, chum, pink, and chinook salmon to Gastineau Hatchery. The sport fishery at the

hatchery is primarily a pink and chum salmon fishery in July and August, and a coho salmon fishery in September, although smaller returns of chinook salmon are also targeted.

In 1991, the hatchery, in cooperation with the Alaska Department of Fish and Game (ADF&G) through the Sport Fish Partnership Program, installed a floating dock to increase access for roadside anglers. Salmon enhancement at Gastineau and nearby Sheep Creek hatcheries (Figure 1) have been extensive in recent years (Table 1), particularly for chinook and coho salmon, the two species of salmon most preferred by anglers in Southeast Alaska (Jones & Stokes 1991).

Since 1993, ADF&G staff have assisted Gastineau Hatchery in developing an onsite creel survey program to estimate sport harvests at the site. Hatchery personnel conduct the survey, while ADF&G analyzed the data to estimate harvests. In 1994 an estimated 70 large chinook salmon (SE = 17), 3,509 large coho salmon (SE = 317), 593 chum salmon (SE = 66), and 9,197 pink salmon (SE = 560) were harvested (Beers 1995).

Sport harvests of chinook salmon in Southeast Alaska are limited by a management plan which also requires estimations of contributions of hatchery chinook salmon stocks. In 1994, ADF&G entered into an agreement with the Gastineau Hatchery to rear chinook salmon for release at several sites in the Juneau area, including waters around the hatchery. The creel survey will provide

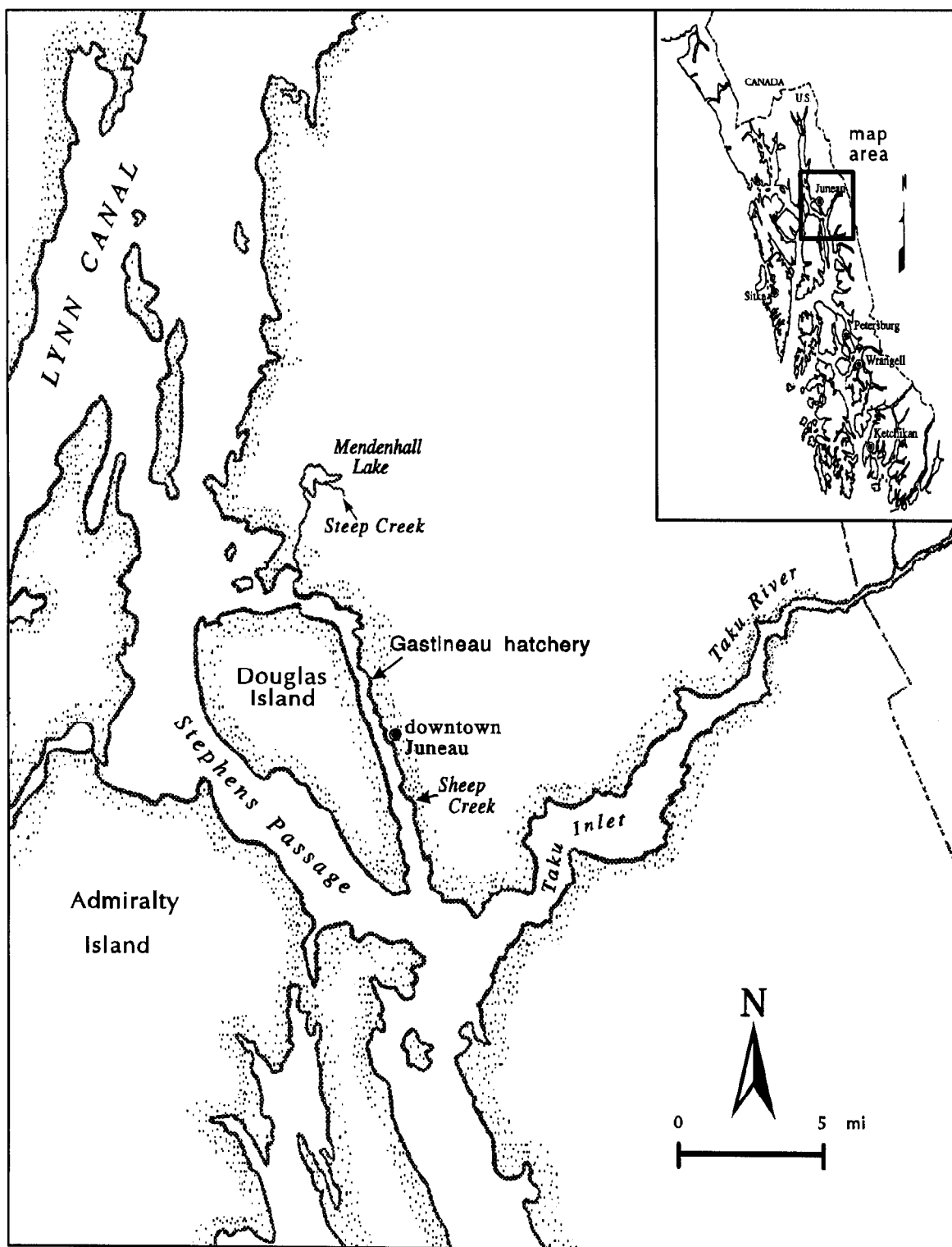


Figure 1.—Location of the Gastineau Hatchery roadside sport fishery, northern Southeast Alaska.

Table 1.—Summary of hatchery-reared salmon smolt releases at Sheep Creek and Gastineau Hatchery since 1990. All fish were reared at Gastineau or Sheep Creek hatcheries except as noted.

Year	Release site	Pink	Chum	Chinook	Coho
1990	Sheep Creek	17,962,133	3,073,538	127,155 ^a	533,233
	Gastineau Hatchery	9,669,565	11,586,928	101,462 ^a	546,255
1991	Sheep Creek	16,258,086	37,874,036	100,543 ^a	505,287
	Gastineau Hatchery	14,846,296	11,326,584	43,595	507,819
1992	Sheep Creek	31,636,411	26,585,790	0	582,739
	Gastineau Hatchery	15,420,079	11,959,067	191,765	392,508
1993	Sheep Creek	32,660,175	27,002,939	0	562,150
	Gastineau Hatchery	15,768,972	11,891,265	207,536	477,999
1994	Sheep Creek	0	14,635,458	0	563,357
	Gastineau Hatchery	8,663,398	5,869,938	256,916	380,282
1995	Sheep Creek	0	44,673,729	28,529	611,362
	Gastineau Hatchery	8,539,515	11,825,076	158,681	422,482

^a Reared at Snettisham Hatchery.

information to properly evaluate the hatchery as a release site and terminal harvest area.

In 1995, hatchery personnel repeated the survey and ADF&G staff again provided technical planning and analysis assistance to ensure validity of the survey given personnel and budget constraints.

OBJECTIVE

The objective of the 1995 Gastineau Hatchery roadside creel survey was to estimate effort and harvests of pink, chum, coho and chinook salmon from the floating dock and beach adjacent to the hatchery from 3 July through 15 October, such that estimates were within specified values 95% of the time: angler-hours of effort $\pm 10\%$, coho salmon harvest $\pm 20\%$, pink and chum salmon harvest $\pm 40\%$, and chinook salmon harvest $\pm 60\%$.

METHODS

There are two survey sites: a non-snagging zone that includes a 150-ft floating dock and 100 ft of beach adjacent to the dock (on the side opposite the hatchery building), and an area

open to snagging which includes the remaining 100 yd of beach extending to a private barge landing. Both locations are clearly marked, and fishing rules are enforced by hatchery personnel. Both sites are discrete in shape and size and easily surveyed.

A stratified, two-stage roving creel survey based on expansion of sample ratios was used to estimate fishing effort and harvest from 3 July to 25 September 1995; the survey was terminated three weeks early because of lack of angling effort (Rick Focht, Gastineau Hatchery, Juneau, personal communication). Days were primary sampling units, and anglers within days were secondary sampling units. Two sites (snagging and non-snagging zones), 12 weekly (7-day) seasonal strata, and weekday versus weekend-holiday stratifications were maintained¹. The survey ended on 25 September, the first day of the planned 13th weekly sample period; data for this period were thus not expanded for the

¹ Weekdays = Mondays–Fridays. Weekend/holidays = Saturdays, Sundays, Independence Day (4 July), and Labor Day (4 September).

entire weekly period. There were 49 discrete strata.

The sampling day was defined as beginning at early civil twilight or 0600 (whichever was later) and ending at late civil twilight as computed for the midday of the sample week. Most angling at the site was expected to occur between these hours. During each sampling day, anglers were counted six times. The first 'count' in each sampling day occurred, according to a random selection, at the mid-point of the first, second, or last third of the first one-sixth of each sampling day. Subsequent 'counts' were conducted at intervals equal to one-sixth the length of each sampling day. These counts were considered instantaneous and reflected fishing effort at the time of the count.

Effort was estimated by multiplying the average angler count for the day for each location by the hours available for sampling each day. The harvest per unit effort (HPUE) for each fish species was estimated from completed-trip interviews. The estimated harvest was obtained from the product of the effort and HPUE estimates.

When not counting anglers, the technician interviewed anglers completing their trip without regard to angler success (angler harvest). Interviews were conducted during one-hour periods that alternated between sites (non-snagging or snagging). The site to start interviews in each strata was selected at random and then alternated each day sampled.

During each interview, anglers were asked to report their effort and harvest at the site being sampled. As many completed-trip interviews as possible were obtained during each day selected for sampling. Since hatchery technicians had other assigned duties, interviews were not conducted at some times each day; however, sampling of anglers exiting the survey area was expected to occur roughly in proportion to the number exiting the site at different times of the day.

Angler effort, estimates of total harvest, associated variances and standard errors were calculated according to the following procedures.

The harvest in each stratum was estimated by

$$\hat{H}_h = D_h \bar{H}_h \quad (1)$$

$$\bar{H}_h = \frac{\sum_{i=1}^{d_h} \hat{H}_{hi}}{d_h} \quad (2)$$

where \hat{H}_{hi} is the estimated harvest in day i stratum h , d_h is the number of days sampled in stratum h , and D_h is the total number of days in stratum h .

The variance of the harvest in each stratum was estimated by

$$V[\hat{H}_h] = (1 - f_{ih}) D_h^2 \frac{\sum_{i=1}^{d_h} (\hat{H}_{hi} - \bar{H}_h)^2}{d_h(d_h - 1)} + f_{ih} \sum_{i=1}^{d_h} \hat{V}[\hat{H}_{hi}] \quad (3)$$

where $f_{ih} = d_h / D_h$.

The harvest for each sampling day was estimated by

$$\hat{H}_{hi} = \hat{E}_{hi} \overline{HPUE}_{hi}^* \quad (4)$$

where \overline{HPUE}_{hi}^* is the jackknife estimate of mean HPUE during stratum h day i , and \hat{E}_{hi} is the fishing effort in angler-hours during the same time.

Angler effort in each day was estimated by

$$\hat{E}_{hi} = T_h \bar{x}_{hi} \quad (5)$$

where T_h is the number of hours in a sampling day and \bar{x}_{hi} is the average number of anglers counted in day i stratum h . If $\bar{x}_{hi} = 0$ and anglers were interviewed, then \hat{H}_{hi} in equation (4) was set equal to the observed harvest.

In contrast, if $\bar{x}_{hi} > 0$ and *no* anglers were interviewed, then \overline{HPUE}_{hi}^* in equation (4) was set equal to the mean \overline{HPUE}_{hi}^* for the stratum.

The variance of E_{hi} was estimated by (Wolter 1985)

$$V[\hat{E}_{hi}] = T_h^2 \frac{\sum_{j=2}^{r_{hi}} (x_{hij} - x_{hi(j-1)})^2}{2 r_{hi} (r_{hi} - 1)} \quad (6)$$

where r_{hi} is the number of times anglers were counted in day i .

The variance of the harvest H_{hij} in a period was estimated by (Goodman 1960)

$$V[\hat{H}_{hi}] = V[\hat{E}_{hi}] \overline{HPUE}_{hi}^{*2} + V[\overline{HPUE}_{hi}^*] \hat{E}_{hi}^2 - V[\hat{E}_{hi}] V[\overline{HPUE}_{hi}^*] \quad (7)$$

The \overline{HPUE}_{hi}^* and its variance were calculated according to procedures in Efron (1982). The inherent correctable bias of m_{hi}^2 (the number of interviews in a sampling period) of jackknife estimates were removed according to the procedure in Efron (1982, p. 6).

Harvest and effort (and their variances) for the entire season were the sums of the estimates for each strata.

RESULTS

Sampling information, including angler counts and numbers of completed interviews, is presented in Appendix A1.

Effort for all species totaled 21,546 (SE = 555, RP = 5%) angler-hours. The highest levels of effort were expended during the pink and chum salmon fishery from mid-July to mid-August. An estimated 2,212 (SE = 303, RP = 27%) large coho at least 16 inches (41 cm) in length, 2,047 (SE = 254, RP = 25%) chum, 3,421 (SE = 250, RP = 15%) pink, and 157 (SE = 36, RP = 46%)

chinook salmon were harvested at Gastineau Hatchery from 3 July to 25 September (Table 2). Most of the pink and chum salmon harvest occurred during July and August, whereas the majority of coho salmon were taken in September. Chinook salmon were primarily taken in small numbers during the chum and pink salmon fishery. In addition, 223 (SE = 102) small chinook less than 28 inches (71 cm) and 422 (SE = 103) small coho salmon less than 16 inches (41 cm) in length were harvested.

Appendix A2 contains a listing of the final data sets used for the analysis.

DISCUSSION

Although effort (angler-hours) at the site was slightly lower in 1995 than in 1994 (Beers 1995), a regular influx of pink and chum salmon from early July to mid-August and coho salmon from mid-August to late September allowed continued fishing opportunity throughout the survey period. Harvests of chinook and chum salmon were higher than harvests in 1994, whereas pink and coho salmon harvests were below the previous year.

Additional effort and harvest occurred before the survey period. Normally, chinook salmon begin to mill near the hatchery in mid to late-June and water flow through the fish ladder is turned on at the end of June. In 1995, fish were spotted milling in Gastineau Channel near the hatchery in early June and the water flow was turned on 9 June (R. Focht, Gastineau Hatchery, personal communication).

Between 9 June and 26 June, hatchery personnel interviewed 412 anglers exiting the site; most interviews were conducted during peak harvest periods. During this pre-survey period, technicians observed 49 large and 8 small chinook salmon harvested in 15 days of sampling; adding this harvest to the creel survey estimate gives a minimum harvest estimate of 206 large and 231 small chinook salmon. An additional three chum and one pink salmon were also counted before the start of the survey. Also, because a few anglers

Table 2.—Summary of estimated angler weekly effort and harvest of large chinook, small chinook, large coho, small coho, chum, and pink salmon at the Gastineau Hatchery roadside fishery in 1995.

Weekly period	Angler- hours	Var ^a	Large coho harvest	Var ^a	Small coho harvest	Var ^a	Large chinook harvest	Var ^a	Small chinook harvest	Var ^a	Chum harvest	Var ^a	Pink harvest	Var ^a
7/03-7/09	1,778	15,135	11	106	0	0	81	572	72	561	134	2,945	97	3,318
7/10-7/16	1,935	18,780	0	0	4	12	9	85	5	21	126	6,520	220	3,015
7/17-7/23	2,593	45,490	0	0	0	0	8	39	120	9,698	522	34,122	446	10,988
7/24-7/30	1,707	47,945	0	0	0	0	42	487	0	0	447	9,670	524	8,271
7/31-8/06	1,546	15,870	2	5	0	0	9	55	5	25	86	875	711	7,015
8/07-8/13	2,427	45,123	0	0	0	0	3	7	0	0	524	8,716	1,027	21,157
8/14-8/20	1,946	17,581	45	282	0	0	5	25	12	52	45	426	352	8,286
8/21-8/27	1,563	25,847	181	5,982	30	89	0	0	9	72	163	1,379	40	599
8/28-9/03	1,390	24,347	480	22,199	41	157	0	0	0	0	0	0	4	14
9/04-9/10	1,775	11,801	592	26,698	150	1,348	0	0	0	0	0	0	0	0
9/11-9/17	1,358	31,138	362	9,029	48	248	0	0	0	0	0	0	0	0
9/18-9/24	1,432	8,697	513	26,877	149	8,691	0	0	0	0	0	0	0	0
9/25 ^b	96	755	26	516	0	0	0	0	0	0	0	0	0	0
TOTALS	21,546	308,509	2,212	91,694	422	10,545	157 ^c	1,270	223 ^d	10,429	2,047	64,653	3,421	62,663

^a Variance of effort or harvest estimate.

^b Estimates of effort and harvest are for Monday, 25 September only.

^c An additional 49 large chinook salmon were counted before the survey period.

^d An additional 8 small chinook salmon were counted before the survey period.

fished outside the sampled fishing day during the creel survey season, estimates of total harvest may contain a small negative bias.

Although the sampling design was similar to the design used in 1994 (Beers 1995), several changes were made to insure valid sampling techniques were used in conducting the 1995 survey. Two sites (snagging and non-snagging zones) were designated and samplers were instructed to alternate between sites every hour to interview anglers. While this method improved the integrity of the data collection effort over the previous year, sampling effort in the snagging zone was not always proportional to the numbers of anglers exiting the site at different times of the day, as evidenced by the angler counts and the number of anglers interviewed at the site. This occurred because samplers performed tasks not related to the survey during the sample period scheduled in the more remote snagging zone. This factor contributed to poor precision of coho salmon estimates, as they are harvested in higher proportion in the snagging zone than are other species. Relative precision of effort and harvest of chinook, chum, and pink salmon were within specified values stated in the objectives.

CONCLUSIONS AND RECOMMENDATIONS

Although effort and harvest are not estimated for all Juneau roadside fisheries individually, the Gastineau Hatchery fishery is thought to be the highest-use roadside sport fishery in the Juneau area. It plays an important role by providing fishing opportunities for urban anglers and tourists who may not have time or economic resources to participate in remote roadside or marine boat fisheries. Also, pressure is likely lessened on local wild stocks of salmon on the Juneau road system because of opportunities provided at the hatchery. Documentation of hatchery contributions to the sport fishery through creel surveys can be used to supplement harvest and catch information provided for the Juneau area by the statewide harvest survey.

Results of the 1995 creel survey show that roadside anglers benefited greatly from enhancement efforts at Gastineau Hatchery. Marine boat anglers in the Juneau area harvested an additional 433 (SE = 158) chinook salmon and 990 (SE = 271) coho salmon destined for Gastineau Hatchery (Hubartt et al. 1996). The success and continuation of the Gastineau Hatchery coho, pink, and chum salmon fisheries are directly tied to the ability of the hatchery to meet production goals. Chinook salmon enhancement at the facility is accomplished through a cooperative agreement with ADF&G; continued monitoring of harvests at the site will help evaluate the success of the program.

In recent years harvest and catch information from this fishery has had little impact on U.S./Canada treaty obligations or inseason management decisions, but if tighter restrictions for chinook salmon are enacted in the future, management of terminal hatchery sites could become a more important tool in the regional management plan.

If Gastineau Hatchery plans to continue the survey, continued effort is needed to implement the survey as designed in the operational plan. Sampling the remote portion of the snagging zone continues to pose logistical and technical design problems which need to be addressed in future surveys. Also, chinook salmon harvest estimates would be more comprehensive if the start of the survey coincided with the start of water flow through the fish ladder.

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APPENDIX A

Appendix A1.–Summary of sampling results by date at Gastineau Hatchery in 1995.

Week	Stratum ^a	Date	Site	Angler counts				INTERVIEW SAMPLING INFORMATION						
				No.	Mean	SD	No.	Effort	Large chinook harvest	Small chinook harvest	Large coho harvest	Small coho harvest	Pink harvest	Chum harvest
7/03-7/09	WD	03JUL	NONSNAG	5	5.20	2.77	16	18.50	0	0	0	0	0	0
7/03-7/09	WD	03JUL	SNAGGING	5	5.00	4.90	8	18.00	3	1	0	0	0	1
7/03-7/09	WD	05JUL	NONSNAG	6	7.17	4.96	9	11.00	0	0	0	0	0	1
7/03-7/09	WD	05JUL	SNAGGING	6	5.33	5.28	12	18.50	3	1	1	0	0	6
7/03-7/09	WE/H	04JUL	NONSNAG	6	7.67	3.44	23	38.50	0	1	0	0	0	2
7/03-7/09	WE/H	04JUL	SNAGGING	6	4.50	5.47	17	34.00	7	1	0	0	0	0
7/03-7/09	WE/H	08JUL	NONSNAG	6	13.17	6.24	10	15.50	0	1	0	0	3	0
7/03-7/09	WE/H	08JUL	SNAGGING	6	10.67	7.42	15	42.00	0	4	0	0	2	6
7/03-7/09	WE/H	09JUL	NONSNAG	5	15.80	5.36	23	59.50	1	3	0	0	0	0
7/03-7/09	WE/H	09JUL	SNAGGING	5	6.20	2.05	7	13.00	0	0	0	0	5	2
7/10-7/16	WD	12JUL	NONSNAG	6	9.17	9.20	56	190.00	0	0	0	0	29	6
7/10-7/16	WD	12JUL	SNAGGING	6	8.67	4.89	3	4.50	0	0	0	0	0	0
7/10-7/16	WE/H	15JUL	NONSNAG	6	7.67	6.86	24	28.50	2	1	0	0	9	0
7/10-7/16	WE/H	15JUL	SNAGGING	6	8.50	6.53	5	10.50	0	0	0	0	4	6
7/10-7/16	WE/H	16JUL	NONSNAG	6	5.17	3.76	14	25.25	0	0	0	1	2	1
7/10-7/16	WE/H	16JUL	SNAGGING	6	3.33	5.05	7	11.00	0	0	0	0	1	0
7/17-7/23	WD	18JUL	NONSNAG	6	10.50	5.72	33	72.75	1	0	0	0	6	8
7/17-7/23	WD	18JUL	SNAGGING	6	11.00	10.24	11	33.00	0	0	0	0	2	17
7/17-7/23	WD	21JUL	NONSNAG	6	14.33	7.15	23	39.00	0	0	0	0	6	4
7/17-7/23	WD	21JUL	SNAGGING	6	9.33	9.07	6	14.50	0	4	0	0	4	1
7/17-7/23	WE/H	22JUL	NONSNAG	6	14.67	8.04	53	74.00	0	0	0	0	8	9
7/17-7/23	WE/H	22JUL	SNAGGING	6	7.67	7.53	27	44.00	0	0	0	0	22	21
7/17-7/23	WE/H	23JUL	NONSNAG	6	11.33	10.07	51	105.50	1	0	0	0	30	11
7/17-7/23	WE/H	23JUL	SNAGGING	6	8.67	7.34	21	37.50	0	0	0	0	6	15
7/24-7/30	WD	24JUL	NONSNAG	6	5.83	3.31	32	80.00	2	0	0	0	24	0
7/24-7/30	WD	24JUL	SNAGGING	6	5.00	4.00	14	20.50	2	0	0	0	11	10
7/24-7/30	WD	27JUL	NONSNAG	6	11.50	7.40	26	57.75	1	0	0	0	9	4
7/24-7/30	WD	27JUL	SNAGGING	6	6.50	4.64	8	14.00	0	0	0	0	5	7
7/24-7/30	WE/H	29JUL	NONSNAG	6	12.17	8.77	32	71.00	1	0	0	0	20	14
7/24-7/30	WE/H	29JUL	SNAGGING	6	6.17	5.98	10	14.50	0	0	0	0	4	13
7/24-7/30	WE/H	30JUL	NONSNAG	6	6.67	7.20	22	46.50	2	0	0	0	23	7
7/24-7/30	WE/H	30JUL	SNAGGING	6	7.00	5.87	5	8.50	0	0	0	0	2	2
7/31-8/06	WD	31JUL	NONSNAG	6	7.17	5.64	38	82.25	0	0	0	0	42	4
7/31-8/06	WD	31JUL	SNAGGING	6	4.50	6.28	15	27.00	0	0	0	0	8	0
7/31-8/06	WD	02AUG	NONSNAG	6	5.67	3.78	20	31.00	1	0	0	0	16	2
7/31-8/06	WD	02AUG	SNAGGING	6	3.00	2.97	15	24.50	0	1	0	0	4	5
7/31-8/06	WE/H	05AUG	NONSNAG	5	11.40	4.39	31	89.00	0	0	1	0	23	1
7/31-8/06	WE/H	05AUG	SNAGGING	5	6.00	5.10	9	35.50	0	0	0	0	14	6
7/31-8/06	WE/H	06AUG	NONSNAG	5	12.40	7.64	62	128.00	1	0	0	0	92	2
7/31-8/06	WE/H	06AUG	SNAGGING	5	15.40	11.72	54	144.00	0	0	0	0	84	6
8/07-8/13	WD	07AUG	NONSNAG	6	10.17	5.85	64	156.00	0	0	0	0	53	4
8/07-8/13	WD	07AUG	SNAGGING	6	15.33	12.04	43	145.00	0	0	0	0	90	48
8/07-8/13	WD	11AUG	NONSNAG	6	13.17	8.16	37	85.00	0	0	0	0	8	0
8/07-8/13	WD	11AUG	SNAGGING	6	11.17	10.09	26	56.50	0	0	0	0	36	35
8/07-8/13	WE/H	12AUG	NONSNAG	6	9.00	7.24	53	132.00	0	0	0	0	55	3
8/07-8/13	WE/H	12AUG	SNAGGING	6	9.83	7.94	54	114.50	2	0	0	0	24	16
8/07-8/13	WE/H	13AUG	NONSNAG	6	6.17	6.43	38	69.50	0	0	0	0	39	3
8/07-8/13	WE/H	13AUG	SNAGGING	6	4.00	5.40	45	54.00	0	0	0	0	34	5
8/14-8/20	WD	18AUG	NONSNAG	6	8.50	7.71	10	20.50	0	0	0	0	9	0
8/14-8/20	WD	18AUG	SNAGGING	6	8.00	7.75	8	16.50	0	0	1	0	0	0
8/14-8/20	WE/H	19AUG	NONSNAG	6	10.00	6.54	48	87.50	0	0	0	0	3	0
8/14-8/20	WE/H	19AUG	SNAGGING	6	9.67	8.80	26	54.50	0	0	1	0	6	3
8/14-8/20	WE/H	20AUG	NONSNAG	6	11.50	5.72	60	116.00	0	1	0	0	2	1
8/14-8/20	WE/H	20AUG	SNAGGING	6	12.67	8.85	32	39.00	1	2	0	0	6	7
8/21-8/27	WD	22AUG	NONSNAG	6	5.50	4.28	28	44.25	0	0	1	0	1	0
8/21-8/27	WD	22AUG	SNAGGING	6	10.33	5.61	44	115.50	0	0	9	4	6	25
8/21-8/27	WD	25AUG	NONSNAG	6	6.33	4.46	9	14.50	0	0	0	0	1	0
8/21-8/27	WD	25AUG	SNAGGING	6	6.17	3.97	13	28.00	0	1	15	2	0	9
8/21-8/27	WE/H	26AUG	NONSNAG	6	9.00	6.00	37	93.00	0	0	6	0	0	2
8/21-8/27	WE/H	26AUG	SNAGGING	6	9.67	4.68	35	98.50	0	0	5	0	0	1
8/21-8/27	WE/H	27AUG	NONSNAG	5	6.20	6.87	42	109.50	0	0	4	0	0	0
8/21-8/27	WE/H	27AUG	SNAGGING	5	7.80	8.67	41	166.50	0	0	3	0	0	0
8/28-9/03	WD	29AUG	NONSNAG	6	4.00	3.16	25	40.25	0	0	2	0	1	0
8/28-9/03	WD	29AUG	SNAGGING	6	4.00	4.24	7	4.50	0	0	0	0	0	0
8/28-9/03	WD	01SEP	NONSNAG	6	3.67	4.03	16	26.50	0	0	11	1	0	0
8/28-9/03	WD	01SEP	SNAGGING	6	6.50	6.22	20	46.50	0	0	31	0	0	0
8/28-9/03	WE/H	02SEP	NONSNAG	6	10.00	1.55	33	113.00	0	0	51	7	0	0
8/28-9/03	WE/H	02SEP	SNAGGING	6	11.33	8.94	53	123.00	0	0	67	8	0	0
8/28-9/03	WE/H	03SEP	NONSNAG	6	12.33	11.81	48	147.50	0	0	2	0	0	0
8/28-9/03	WE/H	03SEP	SNAGGING	6	15.50	12.00	80	194.50	0	0	85	14	0	0

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Appendix A1.—Page 2 of 2.

Week	Stratum ^a	Date	Site	Angler counts				INTERVIEW SAMPLING INFORMATION						
				No.	Mean	SD	No.	Effort	Large chinook harvest	Small chinook harvest	Large coho harvest	Small coho harvest	Pink harvest	Chum harvest
9/04-9/10	WD	05SEP	NONSNAG	5	8.80	3.35	25	34.50	0	0	12	0	0	0
9/04-9/10	WD	05SEP	SNAGGING	5	6.80	2.28	5	8.00	0	0	9	0	0	0
9/04-9/10	WD	07SEP	NONSNAG	6	8.33	3.44	22	37.50	0	0	2	0	0	0
9/04-9/10	WD	07SEP	SNAGGING	6	7.83	5.81	11	43.00	0	0	13	0	0	0
9/04-9/10	WE/H	04SEP	NONSNAG	6	14.33	9.20	50	122.25	0	0	14	20	0	0
9/04-9/10	WE/H	04SEP	SNAGGING	6	14.83	5.46	26	96.50	0	0	22	19	0	0
9/04-9/10	WE/H	09SEP	NONSNAG	6	5.50	4.14	30	58.00	0	0	2	28	0	0
9/04-9/10	WE/H	09SEP	SNAGGING	6	7.83	3.87	56	144.50	0	0	42	13	0	0
9/04-9/10	WE/H	10SEP	NONSNAG	5	8.80	7.85	32	56.75	0	0	10	2	0	0
9/04-9/10	WE/H	10SEP	SNAGGING	5	8.40	3.97	63	188.25	0	0	102	30	0	0
9/11-9/17	WD	12SEP	NONSNAG	6	7.00	3.22	10	14.50	0	0	0	0	0	0
9/11-9/17	WD	12SEP	SNAGGING	6	8.00	4.15	4	9.00	0	0	4	0	0	0
9/11-9/17	WD	13SEP	NONSNAG	6	4.67	2.58	6	14.00	0	0	1	1	0	0
9/11-9/17	WD	13SEP	SNAGGING	6	3.00	2.10	12	18.00	0	0	7	0	0	0
9/11-9/17	WE/H	16SEP	NONSNAG	6	9.00	6.07	41	99.25	0	0	36	7	0	0
9/11-9/17	WE/H	16SEP	SNAGGING	6	11.17	9.81	29	92.00	0	0	25	6	0	0
9/18-9/24	WD	18SEP	NONSNAG	6	5.50	2.51	20	32.75	0	0	8	0	0	0
9/18-9/24	WD	18SEP	SNAGGING	6	7.67	4.80	10	18.00	0	0	7	0	0	0
9/18-9/24	WD	21SEP	NONSNAG	5	5.80	2.28	14	24.00	0	0	1	2	0	0
9/18-9/24	WD	21SEP	SNAGGING	5	8.00	7.21	13	24.75	0	0	24	9	0	0
9/18-9/24	WE/H	23SEP	NONSNAG	5	7.40	3.36	23	42.25	0	0	5	8	0	0
9/18-9/24	WE/H	23SEP	SNAGGING	5	11.40	8.96	14	43.50	0	0	11	0	0	0
9/18-9/24	WE/H	24SEP	NONSNAG	6	7.50	4.23	26	40.25	0	0	2	4	0	0
9/18-9/24	WE/H	24SEP	SNAGGING	6	10.83	8.13	8	16.00	0	0	4	0	0	0
9/25-10/01	WD	25SEP	NONSNAG	6	2.83	1.17	16	19.75	0	0	2	0	0	0
9/25-10/01	WD	25SEP	SNAGGING	6	4.50	5.75	7	10.75	0	0	4	0	0	0

^a WD = weekdays (Mondays–Fridays, except 4 July and 4 Sept.); WE/H = weekend/holidays (Saturdays, Sundays, 4 July, and 4 Sept.).

Appendix A2.—Major computer files used for data analysis of Gastineau Hatchery roadside fishery in 1995.

CREEL	TXT	Raw ASCII data file of interviews and angler counts
DIPAC95	DTA	Final edited ASCII data set
DIPAC95	SAS	SAS program to reformat ASCII file
DIPAC95	SSD	Summary subset SAS data file: count and interview data
BOWDEN5A	SAS	SAS program to estimate effort, harvests, and variances
